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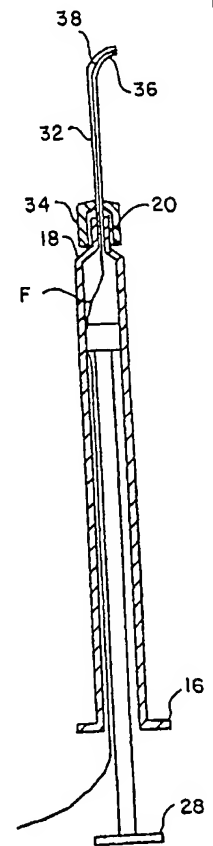
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(54) Title: SUTURE PLACEMENT DEVICE

(57) Abstract

A device (10) for placing sutures is disclosed, the device comprising a barrel (12) and a plunger (22) with a head (26) in the barrel. The device also includes a hollow needle (32) and a cap (34) to which the needle (32) is fixed. The cap (34) serves releasably to connect the needle (32) to the barrel (12). A filament F of suture material passes through the barrel (12) between the head (26) and the barrel (12) and through the passageway (38) in the needle (32) to merge at the tip of the needle (32). By moving the head (26) towards the closed end of the barrel (12), the suture filament (F) is moved forwards and a length of filament (F) emerges from the passageway (38) in the needle (32).



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PLACEMENT OF SUTURES

FIELD OF THE INVENTION

THIS INVENTION relates to the placement of sutures.

BACKGROUND TO THE INVENTION

5 Sutures are conventionally placed by means of a solid curved needle to the rear end of which the suture filament is attached. The needle is gripped by a surgical instrument positioned at right angles to the axis of the needle, and moved through the tissue to be sutured by means of this instrument. Once the needle has passed completely through the tissue, the filament is cut so as to leave two ends that
10 can be tied. The use of a needle and an instrument at right angles to the needle requires a significant measure of space within which to work.

BRIEF DESCRIPTION OF THE INVENTION

 According to a first aspect of the present invention there is provided a device for placing sutures comprising a hollow needle having a shank, a tissue
15 penetrating tip and a passageway extending along the needle from an entrance end at which a filament of suture material, in use, enters the passageway to an exit end at which, in use, the filament exits from the passageway, and means having a first condition in which it grips the filament to prevent the filament being displaced in said

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passageway and a second condition in which it displaces said filament in said passageway to expel suture material from said exit end, the needle being curved so that an end section including said tip lies off to one side of the axis of said shank.

5 According to a second aspect of the present invention there is provided a needle for use in placing sutures, the needle having a shank and a tissue penetrating tip, the needle being curved so that an end section including said tip lies off to one side of the axis of said shank, there being a passageway in the needle, the passageway extending through said shank and said end section and serving, in use, to receive a filament of suture material.

10 According to a third aspect of the present invention there is provided a device for placing sutures comprising an elongate hollow barrel, a plunger in the barrel serving, in use, to grip a filament of suture material between itself and the inside surface of the walling of the barrel and to feed the filament forward when the plunger is displaced along the barrel, a hollow needle fitted to the barrel, the needle having a
15 shank, a tissue penetrating tip and a passageway extending therealong from an entrance end which is in communication with said barrel to an exit end which is remote from the barrel so that a filament can be fed out of the barrel into said passageway through said entrance end and threaded through the passageway to said exit end, the needle being curved so that an end section including said tip lies off to one side of said
20 shank.

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In one form said plunger has a shank and a head and said barrel has a bore comprising first and second sections, the inside diameter of which sections is approximately that of said head of said plunger, and a third section between said first and second sections, the inside diameter of said third section being greater than the outside diameter of said head and greater than the inside diameter of said first and second sections.

The needle is preferably fast with a cap which is a push-fit on said barrel.

Means for mounting a spool of filament on the barrel can be provided. If such means is provided then there can be a hole in the walling of the barrel through which the filament can enter the barrel from a spool carried by said mounting means.

To facilitate single handed operation the portion of the plunger which protrudes from the end of the barrel remote from the needle has an opening therein for receiving the user's thumb, and a pair of lugs protrude laterally from the barrel, each lug having an aperture therein for receiving two of the user's fingers.

According to a fourth aspect of the present invention there is provided a method of placing a suture which comprises threading a filament of suture material through a barrel and through the passageway of a hollow needle which is attached to the barrel so that the leading end of the filament is where the passageway emerges at

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the tip of the needle, positioning a plunger in the barrel so that it grips the filament between itself and the barrel's inside surface, pushing the needle through the tissue to be sutured, advancing the plunger in the barrel so that it moves the gripped filament forward with it so that a length of filament feeds out of the passageway and protrudes from the needle, gripping said length of filament, withdrawing said plunger in the barrel until its grip on the filament is released, and withdrawing said needle from the tissue through which it was passed.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:-

Figure 1 is an "exploded" view of one form of the device of the present invention and also shows a suture filament;

Figure 2 is an axial section illustrating the assembled device with a plunger part way along a barrel;

Figure 3 shows the assembled device with the plunger in a forward position;

Figures 4 to 6 are axial sections illustrating a modified form of the device in three different operative positions;

Figure 7 shows the device of Figures 4 to 6 with the addition of a suture filament supply spool; and

Figure 8 shows a form adapted to facilitate one handed operation.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring firstly to Figure 1, the suture placing device 10 comprises a barrel 12 which is open at both ends. The bore of the barrel is designated 14 and is of constant diameter throughout almost its entire length. There is a flange 16 at one end of the barrel 12.

At the end of the barrel 12 remote from the flange 16 there is a short tapering section 18 and a short tubular section 20.

The device further includes a plunger 22 having a shank 24, a head 26 at one end of the shank, and a disc 28 on which thumb pressure can be exerted at the other end of the shank 24. The head 26 fits snugly in the bore 14.

A combined suturing needle and cap is shown at 30, the needle being designated 32 and the cap being designated 34. The cap 34 is moulded onto one end of the needle 32. The needle 32 has a straight shank and an end section 36 which is remote from the cap 34 and which includes the needle's tissue penetrating tip. The section 36 is curved to form an offset portion which lies off to one side of the axis of the needle's shank. A passageway 38 passes axially through the needle from an entrance at the end of the needle which is embedded in the cap 34 to an exit close to

the tip of the needle.

To use the device, the plunger 22 is removed from the barrel 12 and a filament F of suture material is passed through the bore 14, the cap 34 and the hollow needle until its leading end is at the exit end of the passageway in the needle. The suture material is relatively rigid in nature.

The plunger 22 is inserted into the barrel whilst the filament is held so that it is not fed forward by the head 26 of the plunger 22 as it enters the barrel 12. The head 26 is positioned close to the tapering section 18 as shown in Figure 2. If the filament now protrudes from the exit end of the passageway 38, it is at this stage pulled back until its leading end is within the passageway but close to its exit end.

The needle 32 is then pushed through the tissue to be sutured until the cranked portion 36 of the needle and the exit end of the passageway 38 in the needle 32 emerge from the tissue. It will be appreciated that the movement of the needle is not in a straight line coincident with the needle's axis. The movement is one along a curved line. Hence, in most cases, the place where the needle entered the tissue and the place where it emerges from the tissue are both visible to the surgeon. The barrel 12 is then gripped and thumb pressure is exerted on the disc 28 to push the head 26 forward until it abuts the tapering section 18. Because the filament is trapped between the surface of the barrel's bore and the head 26, the filament is fed forward and a

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length of filament emerges from the exit end of the passageway 38. The length of filament protruding from the passageway 38 is gripped using an appropriate surgical instrument and the plunger 22 withdrawn from the barrel. Because the filament has been gripped it is not dragged back with the head 26. Thereafter the barrel 12, cap 34 and needle 32 are withdrawn. The suture filament slides through the barrel, cap and needle and can thereafter be cut off. The resulting two ends are then tied.

The barrel 12 is preferably of transparent synthetic plastics material and the head 26 of rubber or rubber-like synthetic plastics material. If a fine or soft suture filament that bends easily is being used, the barrel between the head 26 and the tapering section 18 can have a liquid medium therein to facilitate the propulsion of the filament F through the needle.

Turning now to Figures 4 to 6, these illustrate a device which differs from that of Figures 1 to 3 in that the barrel 12 is in three parts designated 12.1, 12.2 and 12.3. The flange 16 is integral with the part 12.3 and the part 12.1 incorporates the sections 18 and 20. The part 12.2 is in the form of a sleeve the inside diameter of which is substantially the same as the outside diameters of the parts 12.1, 12.3. The parts 12.1, 12.3 are push fits in opposite ends of the sleeve.

When the head 26 is in the part 12.2, the filament F is not gripped but can move freely past the head 26. This permits free movement of the filament F in the

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direction of its length and facilitates positioning of its leading end just at the exit of the passageway 38 in the needle 32. The head is then moved forward until it enters the part 12.3 (Figure 4). Once the needle has passed through the tissue, thumb pressure on the disc 28 moves the head 26 to the position shown in Figure 5 and advances the filament F so that a length protrudes from the needle 32. As soon as the protruding length of filament has been gripped, the plunger is withdrawn to the position shown in Figure 6 thereby releasing the grip previously exerted by the head on the filament F. Thereafter the barrel, plunger and needle can be withdrawn without the necessity of separating the plunger from the barrel.

In Figure 7 a mounting bracket 40 is shown which is secured to the barrel 12 and on which a spool 42 of filament F is wound. The filament F passes from the spool 42 through a hole 44 in the part 12.2 to reach the interior of the barrel. As the plunger is advanced from the position shown in Figure 5 to the position shown in Figure 6, the filament F is pulled off the spool 42.

In Figure 8 the plunger 22.1 has an opening 46 in that part thereof which is outside the barrel 12. The user can insert a thumb through the opening 46. Two lugs 48 with apertures 50 are formed integrally with the end of the barrel. The lugs protrude from opposite sides of the barrel and replace the flange 16. The user can insert two fingers through the apertures 50. This ensures that the device can be firmly held and manipulated accurately using one hand only.

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A pair of rollers which move towards and away from one another can be used to grip and to displace the filament. The rollers can be spring loaded to a clamped position and manually separated to permit the filament to be advanced. Alternatively a manually displaceable spring loaded clamping slide can be used to grip and displace the filament.

CLAIMS:

1. A device for placing sutures comprising a hollow needle having a shank, a tissue penetrating tip and a passageway extending along the needle from an entrance end at which a filament of suture material, in use, enters the passageway to an exit end at which, in use, the filament exits from the passageway, and means having a first condition in which it grips the filament to prevent the filament being displaced in said passageway and a second condition in which it displaces said filament in said passageway to expel suture material from said exit end, the needle being curved so that an end section including said tip lies off to one side of the axis of said shank.
2. A needle for use in placing sutures, the needle having a shank and a tissue penetrating tip, the needle being curved so that an end section including said tip lies off to one side of the axis of said shank, there being a passageway in the needle, the passageway extending through said shank and said end section and serving, in use, to receive a filament of suture material.
3. A device for placing sutures comprising an elongate hollow barrel, a plunger in the barrel and serving in use to grip a filament of suture material between itself and the inside surface of the walling of the barrel and to feed the filament forward when the plunger is displaced along the barrel, a hollow needle fitted to the barrel, the needle having a shank, a tissue penetrating tip and a passageway extending

therealong from an entrance end which is in communication with said barrel to an exit end which is remote from the barrel so that a filament can be fed out of the barrel into said passageway through said entrance end and threaded through the passageway to said exit end, the needle being curved so that an end section including said tip lies off to one side of said shank.

4. A device as claimed in claim 3, wherein said plunger has a shank and a head and said barrel has a bore comprising first and second sections, the inside diameter of which sections is approximately that of said head of said plunger, and a third section between said first and second sections, the inside diameter of said third section being greater than the outside diameter of said head and greater than the inside diameter of said first and second sections.
5. A device as claimed in claim 3 or 4, wherein said needle is fast with a cap which is a push-fit on said barrel.
6. A device as claimed in claim 3 and including means for mounting a spool of filament on said barrel.
7. A device as claimed in claim 6, wherein there is a hole in the walling of the barrel through which the filament can enter the barrel from a spool carried by said mounting means.

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8. A device as claimed in claim 3 or 4, wherein said plunger has a portion which protrudes from the end of the barrel remote from the needle, said portion having an opening therein for receiving the user's thumb, and a pair of lugs protruding laterally from the barrel, each lug having an aperture therein for receiving two of the user's fingers to facilitate single handed operation.
9. A method of placing a suture which comprises threading a filament of suture material through a barrel and through the passageway of a hollow needle which is attached to the barrel so that the leading end of the filament is where the passageway emerges at the tip of the needle, positioning a plunger in the barrel so that it grips the filament between itself and the barrel's inside surface, pushing the needle through the tissue to be sutured, advancing the plunger in the barrel so that it moves the gripped filament forward with it so that a length of filament feeds out of the passageway and protrudes from the needle, gripping said length of filament, withdrawing said plunger in the barrel until its grip on the filament is released, and withdrawing said needle from the tissue through which it was passed.
10. A device for placing sutures substantially as hereinbefore described with reference to Figures 1 to 3 of the accompanying drawings.
11. A device for placing sutures substantially as hereinbefore described with reference to Figures 4 to 6 or Figure 7 or Figure 8 of the accompanying drawings.

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12. A method of placing a suture substantially as hereinbefore described with reference to the accompanying drawing.

13. A needle for use in placing sutures substantially as hereinbefore described with reference to the accompanying drawings.

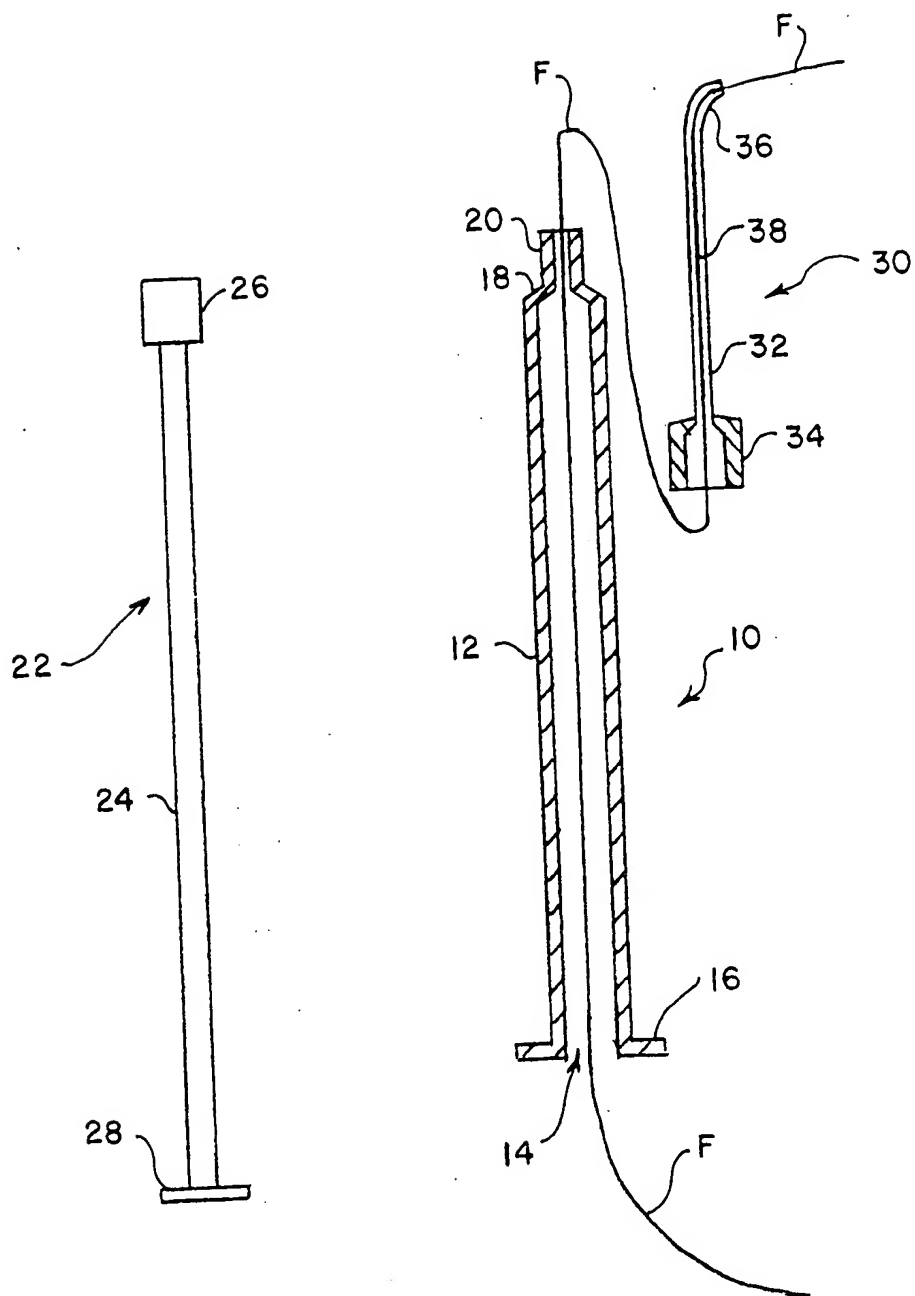


FIG. 1

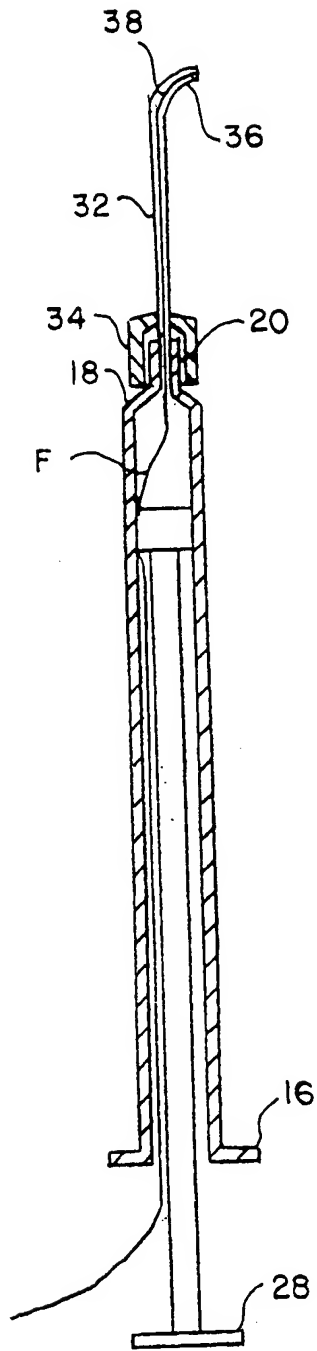


FIG. 2

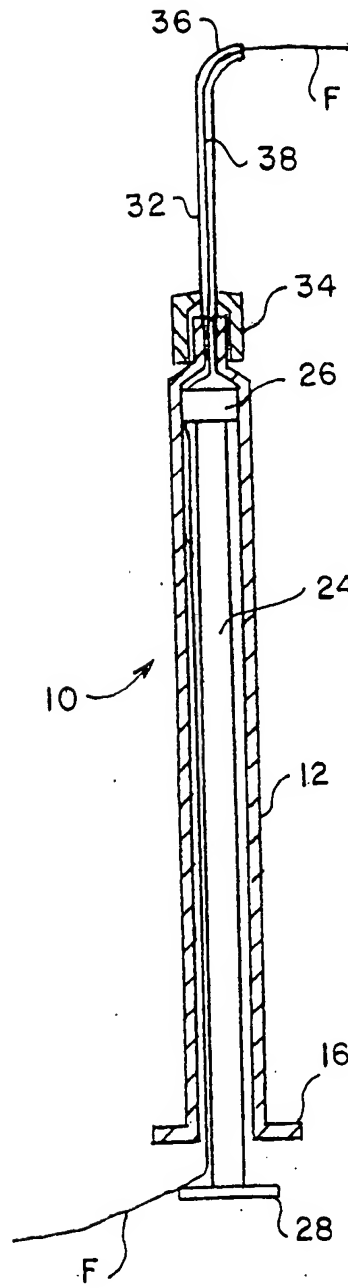


FIG. 3

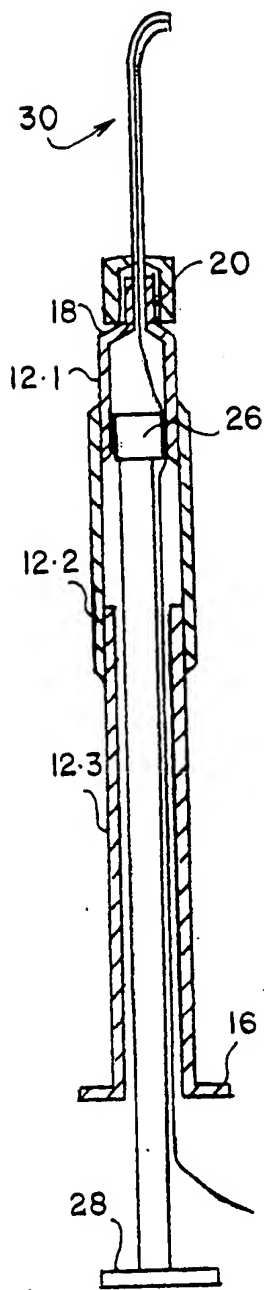


FIG. 4

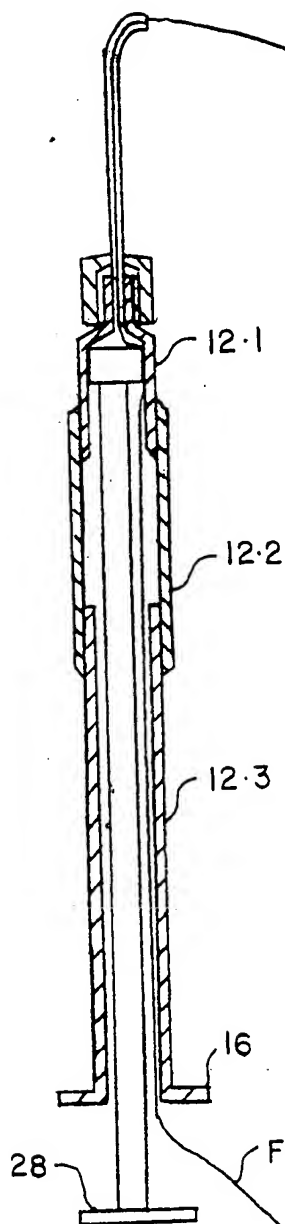


FIG. 5

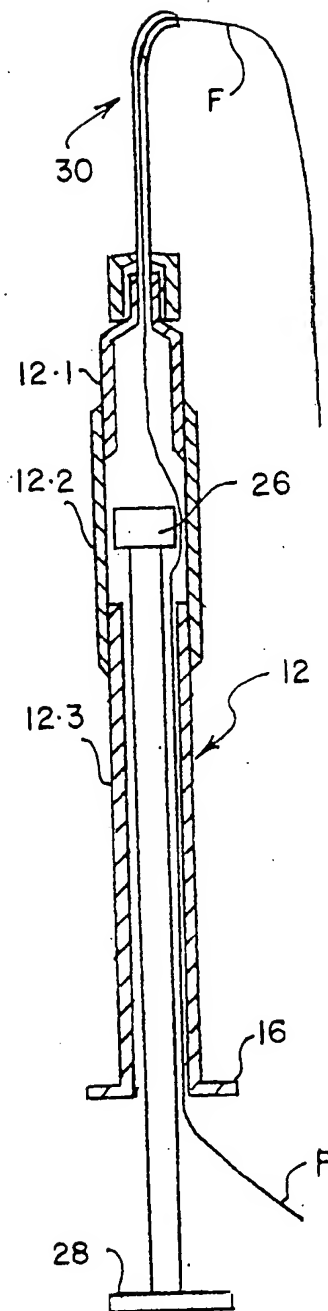


FIG. 6

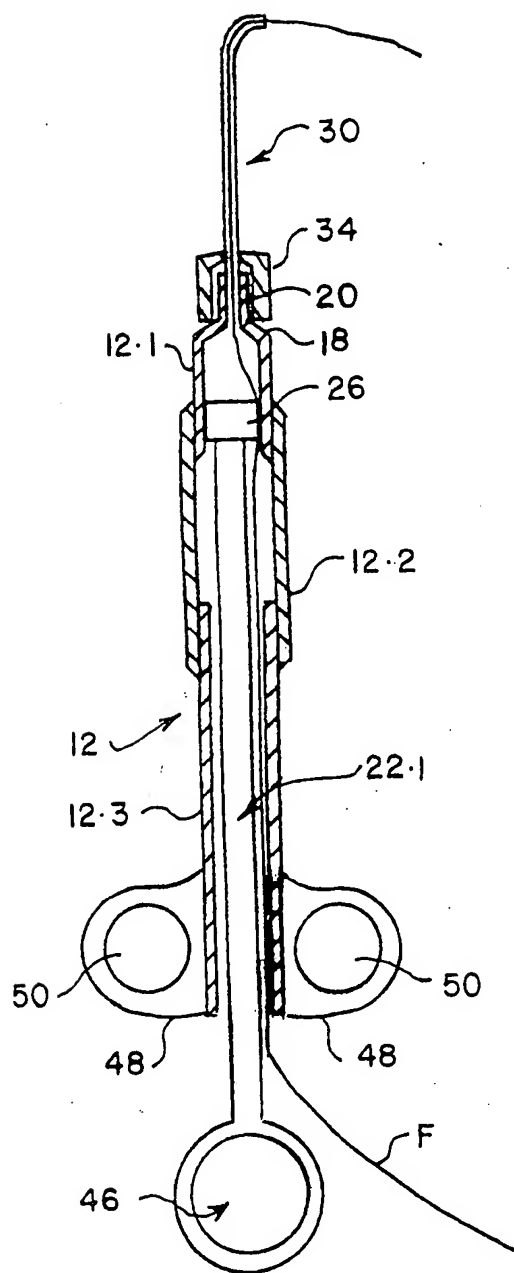


FIG. 8

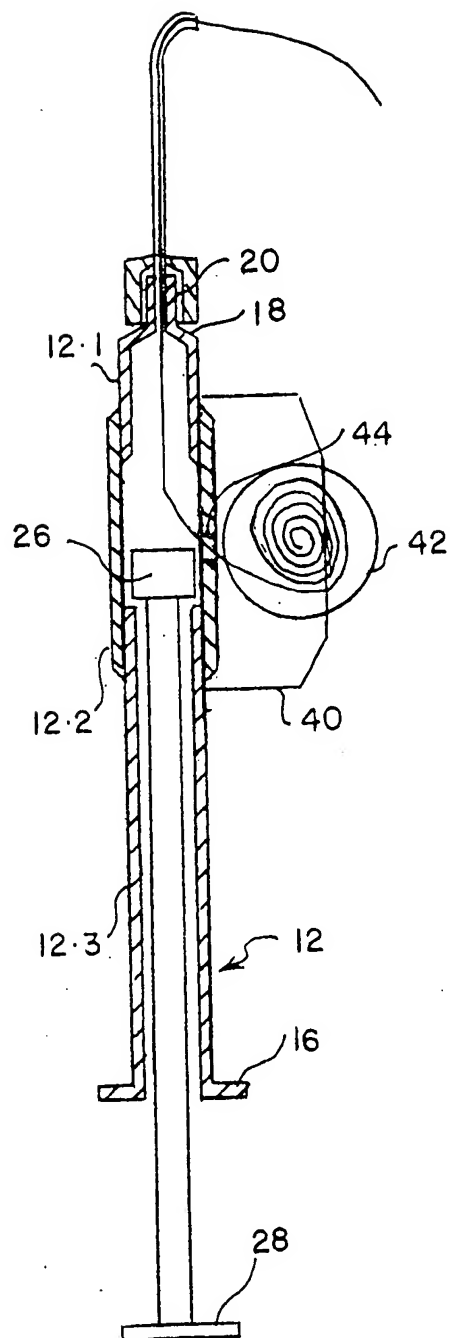


FIG. 7

INTERNATIONAL SEARCH REPORT

International Application No

PCT/ZA 00/00094

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61B17/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 350 385 A (CHRISTY WILLIAM J) 27 September 1994 (1994-09-27) column 3, line 66 -column 4, line 26; figures 2,4	1,2
A		3-13
A	FR 2 147 427 A (LEMONNIER PIERRE) 9 March 1973 (1973-03-09) page 1, line 35 -page 2, line 2; figure	1-13

☐ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		US 5613975 A	25-03-1997
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